Guelph Engineering Leadership Program (GEL)
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Abstract

The Guelph Engineering Leadership program (GEL) is a student-led, co-curricular program that provides opportunities for students to develop leadership competencies through as series of co-curricular workshops developed and delivered for students, by students. This unique program provides an environment for students to develop and deliver leadership workshops, and for students as participants to complete a leadership workshop series that is recognized on a co-curricular experiential learning transcript.

Program Description

The Guelph Engineering Leadership (GEL) program (www.gel.uoguelph.ca) grew out of the belief that engineering is a leadership profession, and out of an interest in providing opportunities for engineering students to develop a mindset and skills beyond the technical, empowering students to influence the development and implementation of impactful, positive engineering solutions. In 2014, School of Engineering (SOE) Professor John Donald established the first graduate level course in Engineering Leadership that continues to be well attended and receives positive feedback from students as a transformative experience. Based on this success, John was looking for opportunities to provide broadly accessible leadership learning experiences to undergraduate students, which is not offered within the traditional engineering curriculum. Catherine Dang, a 4th year engineering student who was President of the Guelph Engineering Student Society in 2020, was also interested in bringing such an opportunity to students in the SOE. Discussions between Catherine and John resulted in the vision to create a student-led, co-curricular engineering leadership program. With this vision, the GEL program was launched in September 2020 to provide leadership opportunities to all interested students and to educate and empower students in personal and professional leadership principles. The GEL program consists of a series of 6 leadership workshops delivered from September through May each year. GEL program workshops are designed, developed and delivered by students under the guidance of the GEL Program Director, Professor Donald. The GEL program director hires students as GEL Program Leads, either as full-time Coop research assistant working on GEL and other projects, or as part-time work-study students working directly on the GEL program. Engagement in at least 4 of the 6 workshops leads to a co-curricular School of Engineering certificate of participation that is recognized on the University of Guelph formal experiential learning transcript. https://www.uoguelph.ca/experiential-learning/pcdr/.

The GEL program has a unique structure that highly engages students as both leaders and participants at three levels. At the first level, the GEL student Program Leads develop the workshop materials, and market, coordinate and deliver the program. At the second level, volunteer student Facilitators are trained by the GEL student Program Leads to facilitate breakout groups during the workshops. At the third level students participate by attending the workshops that are delivered by their student peers. Detailed descriptions of the development and delivery methods can be found in articles by *Ibrahim, Donald & Moresoli* [1] and by *Rodrigues, Donald, et.al.* [2]. Each year there are 2-4 student Program Leads that develop and deliver the GEL program and 3-6 student Facilitators that support workshop breakout groups.

The GEL Program was launched in 2020 during COVID pandemic and for the first four years was delivered as a synchronous online workshop using the Zoom platform. Over 200 students have received a certificate for completing the program. The participation rate in the first year was very high, with over 100 students receiving certificates. In 2020-21 regular university classes were also delivered exclusively in an online mode. Participation in the workshops slowly declined as classes transitioned to in-person delivery post-COVID. In 2024-25 the GEL program transitioned to primarily in-person delivery based on both reduced participation in the online offering and feedback from the students that in-person workshops are more impactful and fit with scheduling better as in-person classes became the norm. One benefit of the online delivery approach is that is offered some unique opportunities for engineering leadership workshop collaborations with students from other institutions from across Canada. In one instance an engineering leadership international collaborative workshop was developed with an institution in Brazil [2]. Collaborative workshops with other institutions will still be offered online.

Connecting Themes

Although there is no single definition for engineering leadership, the GEL program embraces a principle that is common to many engineering leadership programs, namely that leadership is a collective responsibility where "*leadership is not defined by a title or position, rather as a process that takes place between leaders, followers and/or team members*" [4][5]. The GEL program works to provide opportunities to explore a range of leadership education principles that support the development of a leadership mindset and skills within the technical and societal context of engineering. Engineering leadership can also be applied at various scales. To address the different scales of influence associated with leadership development, GEL contextualizes engineering leadership learning using the "Domains of Influence" concept [3] which is represented as "*increasing circles of leadership influence … from self, through team, to organization, and to society"* [3] as represented in Figure 1. Self-leadership skills include emotional intelligence and self-regulation, team leadership includes listening and problem solving with others, organizational leadership includes vision and mission development along with social intelligence, and societal leadership includes concepts such as societal values, technological and environmental stewardship and community building.

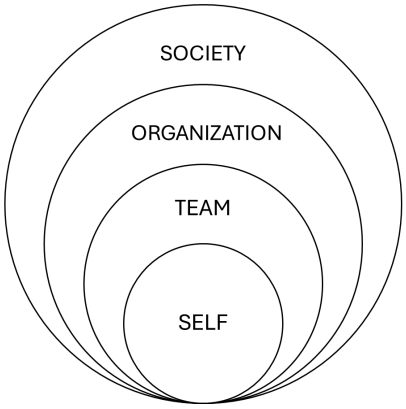

Figure 1 - Leadership Domains of Influence [3]

To situate the relevant application for the concepts, the GEL Program workshops are mapped to the relevant leadership domains of influence and then contextualize to engineering. For example, a workshop on personal values is positioned with the "self-leadership" domain of influence, and the workshop would help students identify their own personal values and how they can be articulated and followed to support their own learning development as an engineering student. To demonstrate this further, example mapping for a selection of GEL leadership workshop topics and domains are listed in Table 1. Additional leadership workshop titles can be found on the GEL website (www.gel.uoguelph.ca)

Table 1 – Selected GEL Leadership workshops and relevant Leadership Domain of Influence

Domain	Workshop Title
All	What is Engineering Leadership?
Self	Personal Values and Self Leadership
Self	Developing Your Personal Brand
Self	Time Management
Self	Marketing Your Confidence and Experience
Self	Developing Cultural Intelligence for Leadership and Change
Self	Change Management and Early Career Development
Team	Team Dynamics and Conflict Resolution
Team	Giving and Receiving Feedback
Organization	Organizational Leadership
Organization	Followership
Organization	Artificial Intelligence Ethics
Society	Sharing Together: Indigenous Principles and Leadership
Society	Empowering Women in Engineering
Society	Engineering and Social Justice
Society	Exploring Indigenous Ways of Knowing in Engineering
Society	Technological Stewardship and the UN Sustainability Goals

Instructional Strategies and Teamwork

GEL Program workshops are structured as 90-minute interactive sessions that follow a general model of introductions followed by a series of content and breakout room activities, culminating in a learning reflection and key takeaways from the session, as depicted in Figure 2. The activities are led by students which enhances participation as the interactions are peer to peer in nature.

Figure 2 – GEL Program 90-Minute Workshop Session Template [1]

The content development by the GEL student Program Leads is iterative in nature with the GEL Program Director providing mentorship on constructive alignment of the workshop as it relates to engineering leadership frameworks, material, activities, reflective practice and evaluation [1].The GEL Program is developed and delivered using a team approach with multiple GEL student Program Leads working to deliver all aspects of the program including development and delivery of the lesson plans and training of the student Facilitators for the workshop breakout groups. Students also run marketing, registration, website development assessment and feedback aspects of the program.

Equity, Diversity, and Inclusion (EDI)

The GEL Program is open and accessible to all students and a diversity of representation in program participation has been observed in practice. To date, GEL student Program Leads are over 50% women and representation from different backgrounds including Indigenous student participation. Equity, Diversity and Inclusion is also intentionally represented in the content the workshops, for example, with topics such as “Empowering Women in Engineering”, “Cultural Intelligence”, “Engineering and Social Justice”, and “Exploring Indigenous Ways of Knowing in Engineering”.

Our Impact

As of May 2024, over 20 different engineering leadership workshop topics have been delivered, with over 200 students completing the GEL Program and receiving certificates. Formal surveys and reflective feedback are completed by participants after each workshop. Testimonials and feedback indicate that the workshops are effective in bringing an awareness of engineering leadership to the participants and can be helpful in how participants approach their own personal and career development. The positive impact of GEL workshop initiatives was also captured in studies of an international collaborative workshop project [1] and by a review of a GEL engineering leadership workshop series related to Technological Stewardship and Grand Challenges [2]. From an anecdotal perspective, for those students that participate as GEL student Program Leads, the experience can be transformative from a personal development perspective, as the leads take on the responsibility for not only for developing and delivering the workshop curriculum and activities, but also for the logistics of the program.

Next Steps

The program continues to be successful and has confirmed there is student interest in developing engineering leadership competencies as part of their engineering learning experience. The program is open to all students, with participation primarily from students in their first and second year of their engineering program. Moving forward, the GEL program would like to increase its impact by acting as a platform to support and inspire additional engineering leadership programming. This includes offering more inter-institutional collaborations, creating opportunities for peer-to-peer leadership coaching at a graduate student and undergraduate student level, integrating leadership concepts more directly in the formal engineering curriculum, and developing more direct connections to industry groups to help enable this growth in engineering leadership development activity.

References

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